CLAIMS

What is claimed is:

1. A pelleted thermoplastic composite, comprising:

a matrix of recycled thermoplastic comprising at least one of the group consisting of polyethylene, polypropylene, nylon, PET and styrene-butadiene rubber; and

a plurality of high-modulus reinforcing fibers, said reinforcing fibers comprising at least one of the group consisting of glass fibers, natural fibers, carbon fibers, and aramid fibers, each of said reinforcing fibers having a minimum modulus of one million psi; said matrix of thermoplastic and said reinforcing fibers forming pellets.

2. The pelleted thermoplastic composite of claim 1, wherein said thermoplastic is derived from carpet and said reinforcing fibers comprise glass fibers in a weight percentage of about 20% to 70%.

3. The pelleted thermoplastic composite of claim 1, wherein said thermoplastic contains at least some amount of non-recycled material.

4. The pelleted thermoplastic composite of claim 1, wherein said natural fibers comprise at least one of the group consisting of cotton, kenaf, sisal and hemp fibers.

5. The pelleted thermoplastic composite of claim 1, wherein said thermoplastic composite is a substantially homogeneous combination of thermoplastic and reinforcing fibers, such that said reinforcing fibers are completely wet out.

6. The pelleted thermoplastic composite of claim 1, wherein said thermoplastic composite has said reinforcing fibers aligned substantially in a first direction.

7. The pelleted thermoplastic composite of claim 6, wherein a length of each of said pellets of thermoplastic composite is at least 1/2 inch, such that lengths of said reinforcing fibers in the first direction are approximately 1/2 inch.

8. The pelleted thermoplastic composite of claim 6, wherein a width of each said pellets of thermoplastic composite is between 1/8 inch and 1/4 inch.

9. The pelleted thermoplastic composite of claim 1, wherein up to 10 percent by weight of said thermoplastic comprises an adhesion promoter for bonding said thermoplastic to said reinforcing fibers.

10. The pelleted thermoplastic composite of claim 9, wherein said adhesion promoter is a graft copolymer of malaeic anhydride with polypropylene.

11. A method of forming a thermoplastic composite, comprising:

providing recycled thermoplastic comprising at least one of the group consisting of polyethylene, polypropylene, nylon, PET and styrene-butadiene rubber;

providing high-modulus reinforcing fibers;

combining said thermoplastic with said reinforcing fibers; and

extruding said thermoplastic and said reinforcing fibers through a die to form the thermoplastic composite.

12. The method of claim 11, wherein the providing reinforcing fibers step comprises providing reinforcing fibers of a substantially continuous length.

13. The method of claim 11, wherein the providing reinforcing fibers step comprises providing reinforcing fibers having a predetermined length of at least approximately 1/2 inch.

14. The method of claim 11, wherein the providing reinforcing fibers step comprises preheating said reinforcing fibers.

15. The method of claim 11, wherein the thermoplastic composite contains at least some amount of non-recycled material.

16. The method of claim 11, wherein the combining step comprises mixing said thermoplastic continuously with said reinforcing fibers, such that said reinforcing fibers are completely wet out by said thermoplastic.

17. The method of claim 16, wherein the combining step comprises mixing said thermoplastic continuously with said reinforcing fibers such that a resultant thermoplastic composite is substantially uniformly mixed.

18. The method of claim 11, wherein the extruding step comprises extruding said thermoplastic composite into a continuous composite bar; and

further comprising cutting said composite bar to a desired length.

19. The method of claim 18, further comprising using at least a portion of said composite bar to manufacture at least one of a molded and a shaped product.

20. The method of claim 18, further comprising cutting said composite bar to a length of at least approximately 1/2 inch to form a product preform.

21. The method of claim 20, further comprising placing said product preform in a compression press and matched die mold; and

forming a molded composite product from the product preform.

22. The method of claim 18, wherein the extruding step comprises extruding said thermoplastic composite such that a width of said composite bar is between approximately 1/8 inch and approximately 1/4 inch.

23. The method of claim 11, further comprising using the thermoplastic composite to manufacture at least one of a molded and a shaped product.

24. The method of claim 11, wherein the providing thermoplastic step comprises plasticating extrusion of said thermoplastic such that said thermoplastic is molten.

25. The method of claim 24, wherein the providing thermoplastic step comprises relatively high shear stress plasticating extrusion of said thermoplastic.

26. The method of claim 11, wherein the providing high-modulus reinforcing fibers step comprises providing reinforcing fibers that are configured to a predetermined length of at least 1/2 inch before combining said reinforcing fibers with said thermoplastic.

27. The method of claim 11, wherein the combining said thermoplastic and said reinforcing fibers step is accomplished in a single, low shear mixing extruder, such that breakage of reinforcing fibers during mixing with thermoplastic is reduced.

28. The method of claim 27, wherein the thermoplastic is sufficiently plasticized in a relatively high shear extruder before combining with said reinforcing fibers in said low shear mixing extruder.

29. The method of claim 11, wherein the combining said thermoplastic and said reinforcing fibers step is accomplished in a two-stage extruder having a high shear zone, wherein the thermoplastic is plasticized, and a low shear zone, wherein the reinforcing fibers are added and mixed with said thermoplastic.